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ABSTRACT

This report describes the fifth in a series of studies assessing micro-teaching and video recording in vocational and technical education. The 48 participants were randomly assigned to eight treatment groups which consisted of combinations of the two levels of the three major variables: (1) video feedback or no feedback, (2) teaching four 5-minute lessons or two 10-minute lessons, and (3) teaching high school students or teaching peers. The focus was on the effect of each of the variables on participants' teaching skills, the effect teaching high school students has on self-confidence in ability to teach, and the participants' attitudes and opinions regarding their experiences. Data were analyzed by a "t" test and analysis of variance of the mean percentage of gain scores. No significant differences were found for or against any of the procedures tested except in the "t" test of gain in teaching skills; however, the attitudes and opinions of the participants reflected strong support for the use of video recording in preservice and inservice trade and industrial teacher education. (GEB)

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Research and Development Series No. 57

Assessment of Micro-Teaching and Video Recording in Vocational and Technical Education: Phase V--

Preservice Trade and Industrial Teacher Education

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The Center for Vocational and Technical Education
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RESEARCH AND DEVELOPMENT SERIES NO. 57

ASSESSMENT OF MICRO-TEACHING AND VIDEO RECORDING IN VOCATIONAL AND TECHNICAL TEACHER EDUCATION: PHASE V--

PRESERVICE TRADE AND INDUSTRIAL TEACHER EDUCATION

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Conducted by
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U.S. DEPARTMENT OF
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PREFACE

The Center has been engaged in a series of studies in the project "Assessment of Micro-Teaching and Video Recording in Vocational and Technical Education" to find more effective and efficient ways of using these two techniques in programs of vocational teacher education. This report describes the fifth of the series, a field test of the feasibility of using micro-teaching and video recording as a means for improving the effectiveness of the time devoted to teaching practice in the preservice trade and industrial teacher education workshop held at The Ohio State University. It is hoped that vocational and technical teacher educators and researchers will find the results of the study interesting and useful.

The study was conducted by The Center through cooperation with the Trade and Industrial Teacher Education Services Office at The Ohio State University, Columbus. We are indebted to Dr. Robert M. Reese, professor and chairman of the Academic Faculty for Vocational-Technical Education, The Ohio State University, for providing the setting for and assisting with the implementation of the field test.

We wish to acknowledge the following persons from The Center for their services in completing the study: Dr. Calvin J. Cotrell, principal investigator; Dr. Charles R. Doty, associate investigator; and James L. Hoerner, graduate research associate and coordinator of the study.

Appreciation for the assistance of the following reviewers is also acknowledged: Dr. David Bjorkquist, Associate Professor, Practical Arts and Vocational and Technical Education, University of Missouri; Dr. Frederick K. T. Tom, Professor, Agricultural Education, Cornell University; and Dr. Warren N. Suzuki, Research and Development Specialist, The Center for Vocational and Technical Education, The Ohio State University.

Robert E. Taylor
Director
The Center for Vocational
and Technical Education

FOREWORD

The series of studies in the project, "Assessment of Micro-Teaching and Video Recording in Vocational and Technical Teacher Education," were feasibility tests and demonstration and field tests conducted in collaboration with several vocational teacher education institutions. This report presents the results of the fifth study in the series, which was conducted in August, 1968. The investigators believe that those who are interested in developing and testing feedback techniques for teacher education will find these reports helpful.

We wish to acknowledge the outstanding cooperation of the Trade and Industrial Teacher Education Services Office at The Ohio State University. We are indebted to Donald L. Karr, co-investigator for the study and teacher educator, James A. Provost, teacher educator, and the members of the workshop who participated in the study.

Recognition is due also to the members of the panel of judges, Willis Bauer and Frank Oliverio, assistant supervisors of the Division of Vocational Education, State Department of Education, Columbus, Ohio, for their valuable assistance in rating the video-taped teaching sessions.

The investigators are most appreciative of the encouragement and administrative support of this effort provided by the director of The Center, Dr. Robert E. Taylor; the coordinator for project utilization and training, Dr. Aaron J. Miller; and the coordinator of research, Dr. Edward J. Morrison. The assistance of a consultant, Dr. Dorothy C. Ferguson, in manuscript revision and synthesis of reviews, is gratefully acknowledged. We also appreciate the assistance of the many supporting personnel of The Center and particularly the editorial director, John Meyer, and his staff.

Calvin J. Cotrell
Charles R. Doty
James L. Hoerner

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SUMMARY

As part of the series of studies assessing micro-teaching and video recording in vocational and technical education, the study reported herein was designed as a field test of three applications of these techniques: use of video feedback, length and number of micro-teaching sessions, and type of student taught. The study was conducted during the two and one-half days set aside for teaching practice sessions in the August, 1968 one-week workshop for preservice trade and industrial education regularly provided by the Academic Faculty of Vocational-Technical Education, College of Education, The Ohio State University.

The 48 participants who took part in the study were randomly assigned to eight treatment groups, which consisted of combinations of the two levels of the three major variables: 1) video feedback or no video feedback, 2) teaching four five-minute lessons or two 10-minute lessons, and 3) teaching high school students or teaching peers. The study focused on six research questions which concerned the effect of each of the variables on participants' teaching skill, the effect of teaching high school students on self-confidence in ability to teach, and the participants' attitudes and opinions regarding their experiences immediately after and eight months after the workshop.

Four instruments were used to collect data--a teaching performance measure, a confidence measure, and two attitude measures. Appropriate data were analyzed by a "t" test and analysis of variance of the mean percentage of gain scores derived from two panel members' ratings of videotapes of the participants' first and last teaching session; an analysis of variance was also computed on the mean percentage of gain scores for each participant's own pre- and post-ratings of his confidence in teaching ability.

While no significant statistical differences were found for or against any of the procedures tested, except in the "t" test of gain in teaching skill within the groups, the attitudes and opinions of the participants reflected strong support for the use of video recording and micro-teaching in preservice and inservice trade and industrial teacher education.

The recommendations for improving the workshop were: 1) using video feedback, teaching a minimum of four five-minute lessons, and involving high school students in the micro-teaching sessions; and 2) increasing the time allotted for the teaching practice sessions. It was also recommended that video feedback be a part of an inservice program for first year trade and industrial teachers.

ASSESSMENT OF MICRO-TEACHING AND VIDEO RECORDING IN VOCATIONAL AND TECHNICAL TEACHER EDUCATION: PHASE V--

PRESERVICE TRADE AND INDUSTRIAL TEACHER EDUCATION

CHAPTER I

BACKGROUND OF THE STUDY

One issue which continues to perplex teacher educators is that of providing adequate preservice experiences for new teachers. Although a matter of concern in all areas of teacher education, the problem is particularly acute in trade and industrial teacher education. When polled recently, a majority of trade and industrial teacher educators expressed dissatisfaction with present programs of teacher education (Fagan, 1968). Also, participants at the 1968 National Invitational Research Development Seminar in Trade and Industrial Teacher Education and Certification indicated that developing the needed professional competencies in teachers and providing desirable preservice experiences for new teachers are questions of national concern (Reese, 1968).

The traditional pattern for trade and industrial preservice teacher education throughout the country is generally a one- to six-week summer workshop. One objective of this workshop typically has been to help the new teachers develop basic teaching skills. One or two days are generally set aside during the workshop for the participants to plan and teach two practice sessions. With this rather limited opportunity to develop the basic pedagogical skills which are so vital for the success of the new trade and industrial teachers, it is imperative that these practice teaching experiences be as effective as possible. One way to improve the quality of the preservice workshop then is to increase the effectiveness of the time presently devoted to the teaching practice sessions.

THE SERIES OF STUDIES

Two recently developed innovations which have captured the attention of teacher educators are micro-teaching and video recording techniques. Since 1967 The Center has been engaged in a series of studies to find more effective and efficient ways of using micro-teaching and video recording in programs of vocational teacher education. Four previous studies were conducted to test the feasibility of video recording as a feedback device in preservice teacher education and included variations on micro-teaching, learner populations, and the evaluation instruments. Fifth in this series, the present study incorporated the results of the

prior studies and was designed as a field test of these innovations in vocational teacher education.

PURPOSE OF THE STUDY

In view of the importance of preservice teacher education, the study was designed to test the feasibility of using micro-teaching and video recording as a means for improving the effectiveness of the time devoted to teaching practice in the preservice trade and industrial teacher education workshop. Specifically, the study was concerned with the following innovations:

1. The use of the videotape recorder as a feedback tool to help the teachers analyze their teaching sessions in the workshop.

2. The teaching of four five-minute micro-teaching lessons in the same allotted time that was customarily used to teach two independent 10-minute lessons.

3. The teaching of the practice sessions to students of the same age level for which the workshop participants were preparing to teach, instead of to peers (other workshop participants), as had been customarily done.

RESEARCH QUESTIONS

The following six questions were formulated for investigation:

1. Will the application and usage of the video recorder as a feedback tool significantly affect the participants' teaching practice performance in the trade and industrial teacher education workshop?

2. Is teaching four five-minute lessons significantly more effective in changing teaching performance in the teaching practice sessions in the preservice workshop than teaching two 10-minute lessons?

3. Will the technique of having the workshop participants teach their practice sessions to students of the age level for which they are preparing to teach, instead of to peers, significantly affect the participants' performance in the workshop?

4. Will the technique of having the workshop participants teach their practice sessions to students of the level which they are preparing to teach instead of to peers

significantly affect the participants' level of self-confidence in their ability to teach?

5. What were the attitudes and opinions of the participants regarding the use of micro-teaching and video recording immediately at the end of the workshop?

6. What were the attitudes and opinions of the participants regarding the use of micro-teaching and video recording eight months after the end of the workshop?

REVIEW OF RELATED LITERATURE

Because the study dealt with the use of micro-teaching and video recording as a means of improving the effectiveness of the teaching practice sessions in the trade and industrial teacher education preservice workshops, the review of the literature focused on readings and reports which have implications for such application.

The introduction of the portable video recorder to teacher education brought about much discussion and innovative thought. It was found that the video recorder has generally been used for two purposes in teacher education: 1) as a substitute for live observations and 2) as a feedback mechanism to help teachers-in-training analyze their practice teaching performances. While the potentiality of the machine is obvious to educators, it should be noted that its effective utilization requires knowledge of how the machine is best used, based on experimentation (Cyphert and Andrews, 1967).

Stanford University was one of the first to investigate ways of using the video recorder in teacher education. Their early investigations brought further refinement and popularity to micro-teaching as a beneficial technique for practicing teaching skills.

Although reported research on the application of micro-teaching and video recording in vocational trade and industrial teacher education was nonexistent, several of the general teacher education studies located have implications for the present study.

Aubertine (1964) found that trainees provided with the opportunity to practice, to correct their mistakes from previous teaching acts, performed significantly better on subsequent demonstrations than a control group which did not have the opportunity to practice. Acheson (1964) concluded that the combination of television feedback with supervisory conferences produced significantly greater effects on subsequent verbal behavior (amount of teacher monologue) than did the supervisory conference without television feedback. In a study in which comparisons were made of the changes

in behavior of trainees who received verbal and video feedback and those who received only verbal feedback from supervision, Olivero (1964) reported that video plus verbal feedback produced greater change in certain selected behaviors than verbal feedback alone. Voth (1968) also found that the use of video feedback with student teachers resulted in a significant increase in the variableness of verbal interaction between teacher and pupil.

In summary, the review of related literature indicated a general acceptance, on the part of teacher educators, of micro-teaching in conjunction with video recording as an effective way to provide teachers-in-training with opportunities to practice and develop pedagogical skills.

CHAPTER II

PROCEDURES IN THE STUDY

The Trade and Industrial Teacher Education Services within the Vocational-Technical Education Department of The Ohio State University regularly provides a one-week, preservice teacher education workshop. The study was conducted during and limited to the two and one-half days of teaching practice sessions set aside during the August, 1968 workshop. The participants in the study included prospective teachers attending the workshop, trade and industrial teacher educators, and high school students from the Columbus area.

PARTICIPANTS IN THE STUDY

Teachers. Of the 62 preservice trade and industrial teachers registered for the workshop, 48 were chosen to participate in the study. Criteria for selection included no prior public school teaching experience and no prior professional teacher education experience. Having come into teaching directly from industry, the 48 male and female teachers represented 13 occupational areas: auto body, auto mechanics, carpentry, commercial food, cosmetology, dental assisting, dietetics, drafting, electricity, machine trades, medical assisting, medical technology, and practical nursing.

To describe the teachers further, it was found that their average age was 39 years; they had had an average of 14 years of schooling, 14 years of work experience, and three years of teaching experience. The teaching experience consisted mainly of teaching in Sunday schools, in Boy or Girl Scout activities, in the military service, and in private schools.

Teacher Educators. Three teacher educators participated in the study; two were trade and industrial teacher educators at The Ohio State University, and the third was a research associate who had been a trade and industrial teacher educator before joining The Center staff. The teacher educators assisted the teachers in analyzing their teaching performances.

Students. Fifteen eleventh- and twelfth-grade high school students were employed from local high school districts to serve as students in the micro-teaching sessions. No selection procedures were used except to maintain three teams of four students,

two boys and two girls. The three additional students served as reserves for the team members.

EQUIPMENT AND FACILITIES

Three rooms equipped with a chalkboard, a demonstration table, and four student chairs, with additional chairs arranged along the back for observers, were used in the study.

Three Ampex 7500 videotape recording systems were used to record all the micro-teaching sessions. One stand-type microphone was located between the students and the teacher to pick up all the dialogue during the lessons. In addition, for those teachers who received video feedback, a 21" monitor-receiver was provided.

TREATMENT DESCRIPTIONS

The first three questions posed in the study (pp. 4-5) identified the three major variables as type of feedback, type of students, and length and number of lessons.

These three questions led then to the development of eight experimental treatments. Each treatment group experienced one combination of the three major variables: 1) type of feedback--video feedback or no video feedback, 2) type of students--high school students or peers, and 3) length and number of lessons--four five-minute lessons or two independent 10-minute lessons. Thus, the eight treatment groups were delineated as follows:

Treatment Group 1 - taught two independent 10-minute lessons to peers and received verbal feedback from a teacher educator and the peers whom they had taught, but no video feedback. (This was the conventional approach customarily used in past workshops.)

Treatment Group 2 - taught two independent 10-minute lessons to peers and received video feedback in addition to verbal feedback from a teacher educator and the peers taught.

Treatment Group 3 - taught four five-minute lessons to peers and received verbal feedback from a teacher educator and the peers taught, but no video feedback.

Treatment Group 4 - taught four five-minute lessons to peers and received video feedback in addition to verbal feedback from a teacher educator and the peers taught.

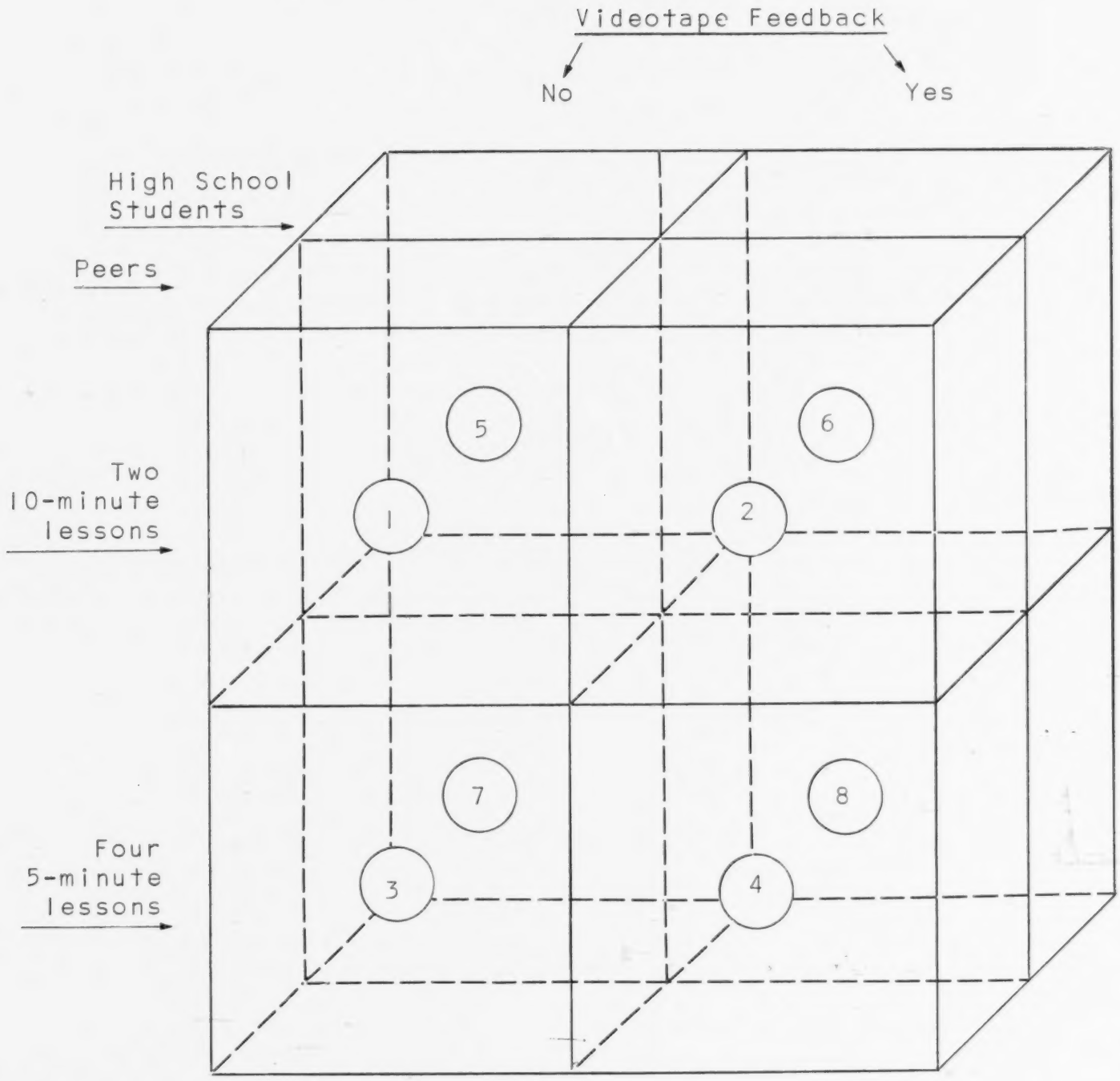

Figure 1. Treatment Matrix

Treatment Group 5 - taught two independent 10-minute lessons to high school students and received verbal feedback from a teacher educator and the students, but no video feedback.

Treatment Group 6 - taught two independent 10-minute lessons to high school students and received video feedback in addition to verbal feedback from a teacher educator and the students.

Treatment Group 7 - taught four five-minute lessons to high school students and received verbal feedback from a teacher educator and the students, but no video feedback.

Treatment Group 8 - taught four five-minute lessons to high school students and received video feedback in addition to verbal feedback from a teacher educator and the students.

The matrix in Figure 1 illustrates the relationship between the treatment variables and the eight treatment groups.

EXPERIMENTAL DESIGN

The experimental design used for the study was a repeated measurement design with the 48 teachers randomly assigned to eight treatment groups and a measurement taken at the end of the first teaching session and last teaching session (See Figure 2).

R	O_1	X_1	O_2
R	O_3	X_2	O_4
R	O_5	X_3	O_6
R	O_7	X_4	O_8
R	O_9	X_5	O_{10}
R	O_{11}	X_6	O_{12}
R	O_{13}	X_7	O_{14}
R	O_{15}	X_8	O_{16}

R = Randomization of teachers to treatments.

O_1, O_3, O_5, O_7, O_9, O_{11}, O_{13}, O_{15} = Observation and evaluation made of each teacher's first teaching session.

(Continued)

O_2, O_4, O_6, O_8, O_{10}, O_{12}, O_{14}, O_{16} = Observation and evaluation made of each teacher's last teaching session.

X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8 = Experimental treatments

Figure 2. Experimental Design

CONDUCT OF THE STUDY

Prior to the two and one-half days of the teaching practice sessions, the study and procedures were explained to the workshop participants selected as teachers. After viewing an instructional videotape which explained and demonstrated the skill of teaching a complete lesson, each teacher received his assignment and teaching schedule, along with lesson planning sheets.

All teachers participating in the study had equal opportunity to observe others teach and to act as "peer-students" in sessions requiring teaching to peers.

The high school students and the peers who served as students were also assigned schedules and were rotated among the micro-teaching sessions so that each teacher always taught a different group.

To avoid the possibility of bias, each of the three teacher educators supervised two teachers from each of the eight treatment groups.

Each micro-teaching session followed the same basic pattern, deviating only in feedback, length of time, and students. Every lesson taught was a complete lesson, comprised of an introduction, presentation, application, and evaluation. All teachers in each treatment group taught one lesson on a manipulative skill and one on theory. If the teacher taught four five-minute lessons, the first two were manipulative lessons, with the second being a re-teaching of the first; the last two were theory lessons, with the fourth a reteaching of the third. If the teacher taught two 10-minute lessons, they were independent of each other in that the first was a lesson on a manipulative skill and the second was a theory lesson.

The micro-teaching lessons were observed by the teacher educator and other participants who were scheduled to observe at that time. Immediately after, the teacher educator, the teacher himself, and the students rated the lesson, using the critique form on teaching a complete lesson. At this time, if the teacher were in one of the video feedback treatment groups, the videotape was played for all present.

The next step in the procedure was the lesson analysis, conducted in the same manner for all micro-teaching lessons and kept to approximately five minutes' duration. Using the completed critique forms as a guide, the teacher of the lesson and then the students gave their reactions and suggestions, followed by the teacher educator's comments and summarization of how the lesson could be improved.

MEASUREMENT INSTRUMENTS

Four measuring instruments were used to collect the data for the study.

Critique Form--Teaching a Complete Lesson--designed to measure the teacher's ability to teach a complete lesson through using the four-step method of teaching: introduction, presentation, application, and evaluation. The 16-item instrument, tested previously in a study conducted by The Center with 30 participants in a distributive education methods class at The Ohio State University, included ratings on whether the teacher did or did not accomplish each task and on the degree of accomplishment (See Appendix A). The scores on the two scales ranged from 0-1 on the accomplished scale (0 = did not accomplish, 1 = did accomplish) and 0-5 on the degree of accomplishment scale (0 = did not accomplish, 1 = very poor, 2 = poor, 3 = average, 4 = good, 5 = excellent).

In addition to the teachers, students, and teacher educators who used the critique form (and had been trained in its use), an independent two-member panel of judges used the form to rate the videotape recordings of each teacher's first and last teaching session in the workshop.

An item analysis was performed to test the reliability of each of the 16 items and the total instrument, using Goode's Simple Item Analysis (Goode, 1967). The test reported the means, standard deviation, variance, and reliability coefficients for each item, as well as a reliability coefficient for the total instrument. As a total instrument, the reliability coefficients computed from the mean scores of the two judges' ratings for the first teaching session were .66 on the accomplished scale and .89 on the degree of accomplishment scale. On the second teaching session, the correlation coefficients for the accomplished and degree of accomplishment scales were .68 and .89, respectively (See Appendix E, Tables 1 and 2).

Confidence Form--modified version of an instrument used by Vlcek (1965) and Bogniard (1968). The instrument was intended to measure the change in the teacher's confidence in his ability to teach which might have been effected by the micro-teaching experiences (See Appendix B).

Each of the 48 teachers completed the Confidence Form both before the first and after the last micro-teaching session.

Workshop Evaluation Form--designed to give each participant in the study a chance to evaluate his experiences during the study (See Appendix C). Each teacher completed the form at the end of the teaching practice sessions.

Follow-up Survey Form--mailed to each teacher after he or she had been teaching for eight months (See Appendix D). The purpose for the delayed survey was to determine, after eight months of teaching, which experiences in the workshop teaching practice sessions the teachers felt had been the most helpful to them.

PANEL RATING PROCEDURES

A two-member panel of judges was selected to rate the videotapes of each teacher's first and last micro-teaching sessions. Both judges were currently involved in vocational education, held a minimum of a master's degree in education, and had had teacher education and supervisory experience in vocational education.

To assure that the panel of judges knew how to use the critique form and that there would be a high degree of rater reliability between their independent ratings, a four-hour training session was held. The two judges viewed and rated videotapes of micro-teaching sessions similar to those performed in the study. After each viewing and rating period, the judges' ratings were compared to ratings previously prepared by other raters on the same videotapes. Once the two judges' ratings consistently agreed with one another and with the previous ratings, the panel viewed and completed the critique form for the videotapes of the study. These videotapes were played in random order, so that the judges were unaware of whether the tapes were recordings of the teachers' first or last micro-teaching sessions or in which treatment group the teacher was involved.

Winer's analysis of variance was used to test inter-rater reliability between the two judges' ratings for both the first and last micro-teaching sessions (Winer, 1962). The inter-rater reliability correlation coefficients for the first micro-teaching session ratings were .96 for the accomplished scale and .93 for the degree of accomplishment scale; and on the last micro-teaching session ratings were .94 and .95, respectively.

PROCEDURES FOR DATA ANALYSIS

The data for testing the null hypotheses posed by the first three research questions (p. 4) were collected from the panel of

judges' ratings on the critique form. Data from the teachers' own pre- and post-ratings on the Confidence Form were used to test the null hypothesis posed by research question four. The two opinionnaires, the Workshop Evaluation Form and the Follow-Up Survey Form, provided data for answering research questions five and six. Though not appropriate for statistical analysis, these data were used to present a summary of the participants' attitudes and opinions.

All raw data used for the major statistical analyses were reduced to mean percentage of gain scores, calculated by dividing the difference between the mean score for the first and last micro-teaching sessions by the difference between the highest possible score and the mean score on the first micro-teaching sessions (Cratty, 1964).

Tests of analysis of variance using the BMD07V Biomedical Computer Program were computed for all major tests of significance (Dixon, 1967). Decisions of whether or not to reject the null hypotheses were made at the .05 level of significance.

CHAPTER III

RESULTS OF THE STUDY

The results of the data collection and analysis are presented in this chapter. Included are the findings relative to the effects of the three variables--feedback, length of time, and students--on the teaching performances of the workshop members who participated in the study; the effect of type of student taught on the participants' self-confidence in their teaching ability, and the participants' opinions and attitudes regarding their experiences.

EFFECTS ON TEACHING PERFORMANCE

The first three research questions of the study, which dealt with the use or nonuse of video feedback, teaching four five-minute lessons or two 10-minute lessons, and teaching high school students or peers, were stated as null hypotheses and tested by comparing the mean percentage of gain scores in teaching skill between the eight treatment groups, as measured by the critique form on teaching a complete lesson (See Appendix E, Table 3). Each of the analyses of variance computed, with a total of 24 subjects in each cell, revealed no significant differences between the treatments (See Appendix E, Table 4). Further tests conducted with cells of 12 and six subjects also yielded no significant differences.

In addition, an investigation was made to determine if significant differences existed on certain selected behavior items on the critique form, between the groups which did have video feedback and the groups which did not and between those who taught high school students and those who taught peers. Items 13, 14, 15, and 16 of the form were selected because they yielded high variance, low means, and high reliability and appeared to be readily observable behaviors (See Appendix A and Appendix E, Table 2). Since the greatest possibility for change in teaching performance existed within those groups which taught four five-minute lessons, because of the two additional opportunities for teaching and feedback experiences, the tests on the four items were conducted only with the groups that taught this sequence. However, the analysis of variance for each of the four selected items comparing these groups also revealed no significant differences.

After testing for significant differences in teaching performance between the two levels of each of the three major variables, a paired "t" test was computed to test for significant gain within the treatment groups from their first micro-teaching sessions to their last micro-teaching sessions. The test revealed that the group that had had no video feedback, the group that had taught peers, and the group that had taught four five-minute lessons had gained significantly from their first to their last teaching sessions on the accomplished scale of the Teacher Performance Rating Form. The group that had taught four five-minute lessons also had gained significantly on the degree of accomplishment scale (See Appendix E, Table 5).

EFFECTS ON SELF-CONFIDENCE

The fourth research question of the study, which dealt with the effect of teaching high school students rather than peers, was answered by comparing the mean percentage of gain scores in confidence between the group that had taught high school students and those who had taught their peers, as measured by the Confidence Form (See Appendix E, Table 6). As indicated by Table 7 in Appendix E, the analysis of variance computed revealed no significant differences.

Analyses of variance were computed between groups with cells of 12 or six subjects. Again, there were no significant differences in gain in self-confidence between those who taught high school students and those who taught peers.

Additional exploratory tests were made to determine if teachers who received video feedback or who taught four five-minute lessons had experienced gain in level of self-confidence in ability to teach. No significant differences were found.

COMMENTS ON STATISTICAL RESULTS

The statistical computations employed in the study, based on the given measuring instruments, revealed no significant differences in percentage of gain in teaching skill between those who had video feedback and those who did not, between those who had taught four five-minute lessons and those who had taught two 10-minute lessons, and those who had taught high school students and those who had taught their peers. There were also no significant differences in gain in level of self-confidence in ability to teach between those who had taught high school students and those who had taught their peers.

There are several possible reasons why these results were obtained. Two and one-half days, the duration of the experiment, was perhaps too short a time for observable differences to occur. Research evidence supports the thesis that in the initial stages

of learning a new skill, improvement is frequently very slow (Harris, 1960). Considering the fact that the micro-teaching practice experiences in the workshop were relatively brief, it may be that significant differences between the groups could not be observed.

A second reason, related in part to the short duration of the experiment, is that adults tend to learn or change less rapidly than do younger people (Brunner, 1959). Most of the past research dealing with the application of micro-teaching and video recording in teacher education has been conducted with younger teachers-in-training, people of average college age. Since the mean age of the workshop participants was 39, it may be expected that change might not have been as rapid as with younger, college-age people.

Perhaps the "golf-grip phenomenon" may have some bearing on the lack of observable change in the study. Allen defined this phenomenon as the case in which a novice appears to do worse before he starts to improve after having been shown a new technique (Allen, 1967).

Still another reason for the lack of significant differences developing between the groups may be that the instruments were not capable of measuring changes that actually did take place. Research has shown that, at best, only limited aspects of change can be measured. It has been observed that the often slow improvement in the early stages of learning, referred to as the "floor effect," is frequently due in part to failure or inability to measure that aspect of behavior which is improving (Harris, 1960).

PARTICIPANTS' ATTITUDES AND OPINIONS

To answer the fourth and fifth research questions posed in the study two instruments were used to collect data on the attitudes and opinions of the participants regarding their experiences during the micro-teaching practice sessions of the trade and industrial teacher education workshop. The first, the Workshop Evaluation Form, was administered immediately after the teachers had completed their micro-teaching sessions to obtain immediate reactions to the experience. The other, the Follow-Up Survey Form, was completed by the participants after they had been teaching eight months to determine how beneficial they felt the micro-teaching practice sessions had been in helping them in their roles as new teachers.

Since neither instrument was designed for hypothesis testing, the following is a discussion of the major points and reactions expressed by the participants:

Workshop Evaluation Form. Although 53 percent of the respondents stated that at the outset of the study they had been nervous about being involved with the micro-teaching and video recording techniques, a large majority of the group had strongly positive feelings about their experience after it was over. Given the opportunity in their own schools, 80 percent of the respondents would use videotape recording to improve their teaching skills. In terms of its use in the trade and industrial education workshop, 94 percent of the participants indicated that video feedback had been valuable. Micro-teaching was judged to be a positive aspect of their experience by 70 percent of the respondents.

When queried about the length of time allotted to their teaching practice sessions, 68 percent of the teachers who responded to the item indicated they would have wanted to teach more. Of these, 47 percent were teachers who had taught the two 10-minute lessons and 53 percent had taught the four five-minute lessons.

As to the type of student taught in the micro-teaching sessions, 46 percent of the participants preferred to teach their peers, while 40 percent preferred high school students.

Follow-Up Survey Form. The first item on the opinionnaire asked the respondents to express their feelings about each of the three major variables in the study, based on an opportunity to repeat the trade and industrial education workshop.

Of the 40 participants who responded in the survey, 93 percent (37) indicated that they would prefer to have video feedback in their teaching practice sessions. The three respondents (seven percent) who preferred not to have video feedback had been teachers in the no video feedback group in the workshop.

The second variable in question on the survey form was the issue of teaching peers or high school students in the teaching practice sessions. More of the respondents would prefer to teach high school students in the workshop, 70 percent (28), while 30 percent (12) would prefer teaching their peers. Of the 19 respondents who had taught peers in the workshop, 10 expressed a preference for teaching high school students; of the 21 respondents who had taught high school students, 18 indicated that they would still prefer students and three indicated they would prefer peers.

The third category had to do with teaching four five-minute lessons as opposed to teaching two 10-minute lessons. Twenty-two (55 percent) of the respondents indicated they would prefer the four five-minute lessons, and 45 percent (18) preferred the two 10-minute lessons. Of the 20 respondents who had taught four five-minute lessons, eight indicated they would prefer to teach

two 10-minute lessons. Ten of the 20 teachers who had taught two 10-minute lessons believed that four five-minute lessons would be more beneficial.

A second major item on the follow-up instrument asked the respondents if they would use a video recorder for self-improvement purposes with their own classes if they had a chance. Twenty-seven (68 percent) indicated they would and 32 percent indicated they would not make use of a video recorder in their own teaching. Asked how often they would like to have the experience, 13 of those who would use a video recorder replied they would make use of it once a month, seven said twice a month, two said once a week, and the remainder would use it less often.

SUMMARY OF MAJOR FINDINGS

1. No significant differences were found, in percentage of gain in teaching skill, between those who had had video feedback and those who did not, between those who had taught four five-minute lessons and those who had taught two 10-minute lessons, and between those who had taught high school students and those who had taught peers.

2. In testing teaching skill improvement within the groups, results of the paired "t" test showed that the 24 participants who had taught four five-minute lessons significantly gained (in teaching performance) from their first to their last teaching sessions on both scales of the rating instrument (accomplished scale and degree of accomplishment scale), while the 24 participants who had had no video feedback and the 24 participants who had taught peers gained significantly on the accomplished scale from their first to their last teaching session.

3. No significant differences were found in gain in level of self-confidence in ability to teach between those who had taught high school students and those who had taught peers.

4. A majority of the participants held positive attitudes toward their micro-teaching and video recording experiences in the workshop. Of those who responded to the relevant items, 80 percent would use videotape recording to improve their teaching skills; 94 percent felt the video feedback had been valuable; 70 percent indicated the same for the micro-teaching aspects of the experience; and 93 percent would prefer to have video feedback in a repeated workshop.

5. While only 40 percent of the participants expressed a preference for teaching high school students immediately after the teaching practice sessions, this percentage increased to 70 percent eight months later.

6. Immediately after the workshop, 68 percent of the teachers indicated that they would have preferred more time to teach. Eight months after the workshop, 55 percent of the respondents said they would prefer teaching four five-minute lessons in a repeated workshop.

CHAPTER IV

CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS OF THE STUDY

As part of the series of studies conducted at The Center for Vocational and Technical Education to assess micro-teaching and video recording in vocational and technical teacher education, the study reported here was designed as a field test to determine the feasibility of three applications of these two techniques in a preservice trade and industrial education workshop: video feedback, length of time of teaching sessions, and type of student taught. The study was conducted during the two and one-half days set aside for the teaching practice sessions during the August, 1968 one-week workshop.

Because no significant statistical findings resulted for or against any of the procedures tested, except in the case of testing teaching skill improvement within the groups from their first to their last teaching sessions, conclusions for the study were based upon the results of the two opinionnaires. Recommendations were made based on these results and the insight of those who conducted the study.

CONCLUSIONS

1. The use of video feedback was a beneficial technique in the preservice trade and industrial education workshop.

2. Video recording techniques would also be valuable for self-improvement of teaching skills of first-year trade and industrial teachers.

3. Teaching high school students in the teaching practice sessions of the workshop was a valuable experience for the participants in preparing for their roles as new teachers.

4. Teaching four five-minute lessons in accordance with the micro-teaching cycle was more beneficial than teaching two 10-minute lessons.

5. The allotted two and one-half days was not a long enough period to provide participants of the workshop with adequate practice of teaching skills.

RECOMMENDATIONS

1. Video feedback should be provided following each teaching practice session in the workshop. This feedback experience should be a private session with only the teacher and the teacher educator present.

2. Micro-teaching and video recording should be applied in the inservice program during the first year of teaching experience following the workshop.

3. High school students should be used in the micro-teaching lessons to provide the workshop participants with a more realistic setting.

4. The participants should teach a minimum of four five-minute lessons using the micro-teaching cycle, including the teaching-reteaching concept.

5. Attempts should be made to find ways to increase the period of time provided for teaching practice sessions in the workshop. Perhaps a longer workshop, with at least one week for teaching practice sessions, would be advisable.

IMPLICATIONS FOR FUTURE RESEARCH

Several problems were encountered during the conduct of the study which indicated need for further research. It was suggested in the discussion of the statistical findings in Chapter III that perhaps one of the problems influencing the results was due in part to the very short duration of the study. It is suggested that the study be replicated with similar subjects and a similar setting but providing a longer period of time to determine if measurable change does occur in teaching skill when using micro-teaching and video feedback.

Because the major portion of research in the application of video recording has been conducted with younger persons of college age, more research is needed to determine the effects of the video recorder as a feedback tool with older participants. While anxiety is normally high in such workshop situations, it was noted that a high degree of anxiety was present throughout the study. Research is needed to determine ways to lessen the anxiety in this type of setting, when video recordings are being used with teachers-in-training at this age level.

It was probable that the "golf-grip phenomenon" was present in the study. Further studies should be conducted to see if this is a rather common phenomenon with micro-teaching and video recording and, if so, how long a period of time is necessary before learning begins to improve significantly.

Since there has been a lack of research conducted in the application of micro-teaching and video recording techniques in trade and industrial preservice teacher education, it is suggested that more research be undertaken to discover the most effective ways to apply these techniques with this age group and particular service area.

It has been expressed frequently that observing other people teach is beneficial for a teacher-in-training. However, a high degree of boredom was evident among those workshop participants observing the teaching sessions. Research is needed to determine the best ways for a teacher-in-training to spend his time while other participants are teaching; perhaps it would be more beneficial for him to be viewing model tapes or planning other lessons.

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GLOSSARY OF TERMS

Complete lesson. An act of teaching incorporating the four steps of instruction: introduction, presentation, application, and evaluation.

Micro-teaching. A scaled-down teaching session, five to 10 minutes of teaching to four or five students, in which the teacher participates in the full sequence of the micro-teaching cycle: plan, teach, critique (feedback), replan, reteach, critique.

Peer. In the context of this study, a member of the trade and industrial education workshop who participated in the study as a teacher and served as a student in sessions requiring teaching to peers.

Teacher educator. A person on a university staff who is responsible for the preparation of teachers-in-training and inservice education of teachers in the field.

Teaching practice session. A period of time, two and one-half days in this case, set aside during the preservice trade and industrial education summer workshop to provide the new teachers with an opportunity to practice teaching skills.

Video feedback. The procedure used in the study which involved preparing videotape recordings of all participants' teaching practice sessions to provide opportunities for all reviewers, including the teachers in the appropriate treatment groups, to view a replay of the teaching session during the critique and analysis portion of the micro-teaching cycle and to evaluate change in teaching performance.

APPENDIX A

TEACHING PERFORMANCE RATING FORM

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Teacher's Name _____ / Number

Date _____ / Teach Session

Rater (Check one):

Teacher Educator	__	Teacher	__
Fellow Teacher	__	Student	__
		Panel	__

TEACHING PERFORMANCE
RATING FORM

Teaching A Complete Lesson

Directions: The following items will be used to evaluate the lesson. If the teacher did not accomplish the item, mark "Did Not Accomplish." If the teacher did accomplish the item, mark "Accomplished" and then mark the column which describes how well the teacher "accomplished" the item.

	DID NOT ACCOMPLISH	ACCOMPLISHED	DEGREE OF ACCOMPL.				
			VERY POOR	POOR	AVERAGE	GOOD	EXCELLENT
Did the Teacher in the Lesson:							
1. Have and use necessary instructional materials that appealed to me and helped me gain a clear picture of what was being taught? (e.g., equipment, materials or audio-visual aids)							
2. Provide opportunity for my response and participation?							
3. Vary the pace and methods of presenting the lesson so that I understood and remained interested?							
4. React favorably toward my questions, answers, and comments, and avoid repeating what I said?							
5. Present the lesson so that I could easily follow and understand the lesson from start to finish?							
Did the Teacher in the Introduction:							
6. Link the lesson to my past knowledge or experience so that I could accept the objectives on my own terms?							

	DID NOT ACCOMPLISH	ACCOMPLISHED	DEGREE OF ACCOMPL.				
			VERY POOR	POOR	AVERAGE	GOOD	EXCELLENT
7. State exactly what the objective(s) is in terms of what I am expected to do, why the objective(s) is important to me, how I am to achieve the objectives and when I will know that I have achieved the objectives?							
8. Help me to acquire an interest in the lesson? (For example: Did you want to learn what was to be presented in the lesson?)							
Did the Teacher in the Presentation:							
9. Talk to me and not to the instructional materials? (Note: In some presentations, e.g., one where a teacher is manipulating materials or operating machinery, the teacher must direct his attention to these; but the teacher can also make the student feel that he is receiving direct attention.)							
10. Present each idea or step in the proper sequence, making each stand out?							
11. Present only one idea, or method of doing an operation, at a time? (Or did the teacher present two or more ideas, or methods of doing an operation, which confused you?)							
12. Present the information or skill with ease?							
13. Have me summarize the key points rather than doing it himself?							
14. Clarify any key points not clear to me?							

DID NOT ACCOMPLISH	ACCOMPLISHED	DEGREE OF ACCOMPL.				
		VERY POOR	POOR	AVERAGE	GOOD	EXCELLENT

Did the Teacher in the Application:

15. Observe me practicing (mentally or physically applying) and provide encouragement, correction or additional information to guide me?

Did the Teacher in Testing: (Evaluation)

16. Provide an opportunity for me to show how well I had learned?

Comments: (What can the teacher do to improve the lesson?)

Form developed by the staff of the project, Assessment of Micro-Teaching and Video Recording in Vocational and Technical Teacher Education, The Center for Vocational and Technical Education, The Ohio State University, and adapted for use by the Trade and Industrial Teacher Education Services Office, The Ohio State University, Columbus, Ohio.

APPENDIX B
CONFIDENCE FORM

CONFIDENCE FORM

Your help is needed in revising the educational procedures used in the workshop. Please answer as objectively as possible all the following items.

In which treatment will or did you participate? 1 2 3 4 5 6 7 8
(circle one)

What is your assigned teacher number? _____

Directions: Check in the appropriate column your estimation of your confidence. Zero (0) is no confidence. Two (2) is average confidence. Four (4) is confident.

	Degree of Confidence				
	0	1	2	3	4
1. I am confident that I have the skills necessary to work effectively with individual high school students.					
2. I am confident that I have the skills necessary to work effectively with small groups of high school students.					
3. I am confident that I have the skills necessary to develop and maintain the interest of high school students.					
4. I am confident that I have the skills to handle unexpected situations.					
5. I am confident that I have the ability to establish rapport with high school students.					
6. I am confident that I have the ability to communicate with high school students.					

Form developed by the staff of the project, Assessment of Micro-Teaching and Video Recording in Vocational and Technical Teacher Education, The Center for Vocational and Technical Education, The Ohio State University, and adapted for use by the Trade and Industrial Teacher Education Services Office, The Ohio State University, Columbus, Ohio.

APPENDIX C

WORKSHOP EVALUATION FORM

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WORKSHOP EVALUATION FORM

Your help is needed in revising the procedures and materials for assessing the use of high school students, micro-teaching and video recording in vocational and technical teacher preparation. Please answer as objectively as possible the following questions.

1. In which treatment did you participate - 1 2 3 4 5 6 7 8

   (circle one)

2. What is your assigned teacher number? _____

3. What were your immediate reactions after you learned your teaching sessions were to be videotaped? (For example: Were you worried, uncomfortable or nervous?)

4. If you had the opportunity to use videotape recording in your own school, would you use it for assistance in improving your teaching skill? Yes No

   Why?

5. As a result of your observation and/or participation using micro-teaching, (5-minute lessons with high school students) what is your present evaluation of its use in the workshop?

6. As a result of your observation of others or your receiving video feedback, what is your present evaluation of its use in the workshop? (valuable/not valuable)

7. What differences did you observe in the teaching to peers as compared to the teaching to high school students?

8. Would you like, if time had permitted, to teach more than you did?

9. What changes could be made in the supervisory procedures for:

A. Teacher Educator?

B. Video Feedback?

10. What items on the critique form (Teaching Performance Rating) confused you? How could they be restated?

11. Should any items on the critique form be:

A. Eliminated? Yes No

If yes, which ones?

B. Added? Yes No

If yes, which ones?

12. Were there any items on the critique form with which you disagreed?

Yes No

If yes, which ones?

Form developed by the staff of the project, Assessment of Micro-Teaching and Video Recording in Vocational and Technical Teacher Education, The Center for Vocational and Technical Education, The Ohio State University, and adapted for use by the Trade and Industrial Teacher Education Services Office, The Ohio State University, Columbus, Ohio.

APPENDIX D

FOLLOW-UP SURVEY FORM

FOLLOW-UP SURVEY ON PRESERVICE
TRADE AND INDUSTRIAL EDUCATION WORKSHOP
PRACTICE TEACHING EXPERIENCE
CONDUCTED BY THE TRADE AND INDUSTRIAL
TEACHER EDUCATION SERVICES OFFICE
THE OHIO STATE UNIVERSITY, AUGUST, 1968

Recalling the practice teaching experience that you had during the Trade and Industrial Education workshop and the benefits you derived in helping you in your role as a new teacher, please respond to the following items.

1. If you could repeat the Trade and Industrial Education Workshop, what experience from the following list do you now feel would be the most beneficial? (Check one in each category.)

   Category One - Video Playback

   _____ I would prefer to see a video playback of my practice lessons.

   _____ I would prefer not to see a video playback of my practice lessons.

   Why?

   Category Two - Students

   _____ I would prefer to teach to peers (other workshop participants).

   _____ I would prefer to teach to students of the age level which I will be teaching.

   Why?

   Category Three - Lessons

   _____ I would prefer to teach four five-minute lessons with the second and fourth being replanned versions of the first and third lessons.

   _____ I would prefer to teach two 10-minute lessons.

   Why?

2. a. If you had the opportunity, would you use the video recorder to tape some of your lessons in the classes you are now teaching and then to see the playback privately for self-improvement purposes?

   Yes _____ No _____

   Why?

   b. If you answered yes to the above how often would you like to use the video recorder for this experience?

   Once a week ___ Twice a month ___ Once a month ___

   Why?

3. Please give other comments, changes, or recommendations you have about the practice teaching experiences of the Trade and Industrial Education Workshop, such as technique of evaluation used by the teacher educator, video recording feedback techniques, etc.

Form developed by the staff of the project, Assessment of Micro-Teaching and Video Recording in Vocational and Technical Teacher Education, The Center for Vocational and Technical Education, The Ohio State University, and adapted for use by the Trade and Industrial Teacher Education Services Office, The Ohio State University, Columbus, Ohio.

APPENDIX E
TABLES

TABLE 1
TEACHING PERFORMANCE RATING FORM
ITEM ANALYSIS,* FIRST OBSERVATION

	ACCOMPLISHED SCALE[a]				DEGREE OF ACCOMPLISHMENT SCALE[b]			
Items	Mean	Standard Deviation	Variance	Reliability	Mean	Standard Deviation	Variance	Reliability
1	1.000	0.000	0.000	0.000	4.021	0.661	0.437	0.603
2	0.979	0.143	0.020	0.308	3.573	0.921	0.849	0.506
3	1.000	0.000	0.000	0.000	3.625	0.665	0.443	0.673
4	0.958	0.200	0.040	0.282	3.490	1.010	1.021	0.592
5	0.990	0.102	0.010	0.117	3.750	0.878	0.771	0.637
6	0.792	0.406	0.165	0.137	2.438	1.519	2.309	0.447
7	0.948	0.222	0.049	0.060	2.969	1.150	1.322	0.405
8	1.000	0.000	0.000	0.000	3.615	0.808	0.654	0.731
9	1.000	0.000	0.000	0.000	3.740	0.893	0.797	0.679
10	1.000	0.000	0.000	0.000	3.740	0.794	0.630	0.646
11	1.000	0.000	0.000	0.000	3.823	0.692	0.479	0.650
12	1.000	0.000	0.000	0.000	3.771	0.784	0.614	0.718
13	0.479	0.500	0.250	0.490	1.677	1.857	3.448	0.632
14	0.604	0.490	0.239	0.379	2.021	1.756	3.083	0.521
15	0.677	0.468	0.219	0.568	2.156	1.704	2.903	0.522
16	0.490	0.500	0.250	0.619	1.729	1.868	3.489	0.586
Total				0.663				0.886

*Computed from the mean scores of the two judges for all 48 teachers.
[a]The accomplished scale has a range from 0-1.
[b]The degree of accomplishment scale has a range from 0-5.

TABLE 2
TEACHING PERFORMANCE RATING FORM
ITEM ANALYSIS,* LAST OBSERVATION

Items	ACCOMPLISHED SCALE[a]				DEGREE OF ACCOMPLISHMENT SCALE[b]			
	Mean	Standard Deviation	Variance	Reliability	Mean	Standard Deviation	Variance	Reliability
1	1.000	0.000	0.000	0.000	3.771	0.699	0.489	0.488
2	0.990	0.102	0.010	0.293	3.563	0.888	0.788	0.716
3	1.000	0.000	0.000	0.000	3.480	0.708	0.500	0.568
4	0.980	0.143	0.020	0.134	3.406	0.919	0.845	0.635
5	0.990	0.102	0.010	0.293	3.625	0.832	0.693	0.657
6	0.917	0.276	0.076	0.123	2.802	1.160	1.346	0.492
7	0.948	0.222	0.049	0.040	2.948	1.035	1.070	0.423
8	1.000	0.000	0.000	0.000	3.563	0.643	0.413	0.584
9	1.000	0.000	0.000	0.000	3.677	0.771	0.594	0.631
10	1.000	0.000	0.000	0.000	3.594	0.701	0.491	0.575
11	1.000	0.000	0.000	0.000	3.708	0.676	0.457	0.664
12	1.000	0.000	0.000	0.000	3.604	0.848	0.718	0.748
13	0.594	0.491	0.241	0.421	2.104	1.840	3.385	0.562
14	0.604	0.490	0.239	0.555	1.979	1.677	2.812	0.508
15	0.771	0.420	0.177	0.485	2.548	1.587	2.519	0.679
16	0.625	0.484	0.234	0.637	2.052	1.758	3.091	0.612
Total				0.681				0.893

*Computed from the mean scores of the two judges for all 48 teachers.
[a]The accomplished scale has a range from 0-1.
[b]The degree of accomplishment scale has a range from 0-5.

TABLE 3
TEACHING PERFORMANCE RATING FORM
MEAN PERCENTAGE OF GAIN SCORES
(N=24)

	Accomplished Scale		Degree of Accomplishment Scale	
	Video Feedback	No Video Feedback	Video Feedback	No Video Feedback
Means	-0.053	0.133	-0.381	-0.010
Standard Deviation	0.806	1.016	1.340	0.457

	Four Five-Minute Sessions	Two 10-Minute Sessions	Four Five-Minute Sessions	Two 10-Minute Sessions
Means	0.169	0.089	-0.027	-0.365
Standard Deviation	0.717	1.073	0.397	1.364

	High School Students	Peers	High School Students	Peers
Means	0.060	0.020	-0.330	-0.062
Standard Deviation	0.668	1.119	1.348	0.472

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TABLE 4
TEACHING PERFORMANCE RATING FORM
ANALYSIS OF VARIANCE
OF MEAN PERCENTAGE OF GAIN SCORES
(N=24)

	ACCOMPLISHED SCALE				DEGREE OF ACCOMPLISHMENT SCALE			
	Video Feedback				No Video Feedback			
Source	S.S.	d.f.	M.S.	F*	S.S.	d.f.	M.S.	F*
Between Groups	0.412	1	0.412	0.49	1.653	1	1.653	1.65
Within Groups	38.665	46	0.841		46.137	46	1.003	
	Four Five-Minute Lessons				Two 10-Minute Lessons			
Between Groups	0.020	1	0.020	0.96	1.373	1	1.373	1.36
Within Groups	38.280	46	0.832		46.418	46	1.009	
	Teaching to High School Students				Teaching to Peers			
Between Groups	0.020	1	0.020	0.02	0.859	1	0.859	0.84
Within Groups	39.057	46	0.849		46.931	46	1.020	

*Significant at the .05 level if $\geq$ 4.05.

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TABLE 5
TEACHING PERFORMANCE RATING FORM
PAIRED "t" TESTS, WITHIN GROUPS
(N=24)

Treatment Group	Accomplished Scale	Degree of Accomplishment Scale
Video Feedback	-0.28	-0.55
No Video Feedback	3.06*	1.14
Teaching to Peers	2.20*	0.39
Teaching to High School Students	0.44	-0.15
Teaching Two 10-Minute Lessons	0.70	-0.33
Teaching Four Five-Minute Lessons	3.20*	2.45*

*Significant at the .05 level if $\geq$ 2.07.

TABLE 6
CONFIDENCE FORM
MEAN PERCENTAGE OF GAIN SCORES
(N=24)

	Teaching High School Students	Teaching Peers
Mean	0.041	0.065
Standard Deviation	0.193	0.359

TABLE 7
CONFIDENCE FORM
ANALYSIS OF VARIANCE OF MEAN PERCENTAGE OF GAIN SCORES
OF GROUP THAT TAUGHT PEERS AND
GROUP THAT TAUGHT HIGH SCHOOL STUDENTS
(N=24)

Source	S.S.	d.f.	M.S.	F*
Between Groups	0.007	1	0.007	0.09
Within Groups	3.822	46	0.083	

*Significant at the .05 level if $\geq$ 4.05.

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